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ABSTRACT

In the years following the appearance of Noam Chomsky's book, "Syntactic Structures," in 1957, transformational grammarians modified and improved his initial model of language. The notion of a deep structure of meaning underlying a sentence's surface structure was revised to embody elements representing negation, command, and interrogation, and to reveal subordination and coordination. "Meaning-changing" transformations became unnecessary. The complicated subcategorization system was replaced by a non-hierarchical model which represented the characteristic features of individual words in a part of the deep structure called the lexicon. Although a 1965 book by Chomsky, "Aspects of the Theory of Syntax," incorporated these modifications, linguists were still not satisfied with the adequacy of deep structure in representing some areas of meaning. They sought a deeper, more abstract level of structure "where the various semantic notions would be separated out" and where a concern with sentences would give way to a concern with propostions. Nevertheless, the essential human mystery of language remains. (LK)

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In the February 1969 issue of *The English Record* on Creative Writing, the name of William Heyen, State University College, Brockport, New York, as *Guest Editor* was omitted. We wish to correct the oversight and give him the credit which he so richly deserves for helping to put together what we think—immodestly, perhaps—is a superb issue.

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RECENT DEVELOPMENTS IN TRANSFORMATIONAL GRAMMAR

Roderick A. Jacobs

Noam Chomsky's pioneer book, *Syntactic Structures* is now well into its second decade. Linguistics today is a very different field from linguistics in 1957, and it was this book that started the change. Chomsky succeeded in showing that earlier grammars of human languages were incapable of dealing with some of the most important properties of language. The sets of rules used could not account for the infinite set of sentences that makes up any human language. The empirical claims made by such grammars were limited by their format: listing of categories and items, procedures for cutting up sentences and so forth. Consequently such grammars could do little to help us understand the nature of a language system which could be learned so rapidly by small children, a system allowing infinite creativity to its users. The grammars, or rather fragments, since no one has yet written a full one—could not explain how native speakers understand expressions in one way rather than another, how they were able to make use of certain kinds of syntactic information not obviously present on the surface of sentences to interpret them correctly. Chomsky's vastly more powerful model of language included two principal levels of structure: a deep structure which in some not always precise manner embodied the meaning, and a surface structure which was the set of forms which are converted into sound or writing as the sentences of a language. The deep structure was a level produced (or generated) by a set of rules, called Phrase Structure Rules, enumerating the basic parts of a sentence, e.g.,

Sentence → Noun Phrase Auxiliary Verb Phrase

or

S → NP AUX VP

Then a set of transformations, some obligatory, some optional, converted these deep structures into surface structures. Certain very simple sentences to which only obligatory transformations had been applied were called *kernel sentences.* The transformations were not rules like the one illustrated above. Instead of expanding elements such as sentence, noun phrase, auxiliary,

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verb phrase into their component parts, transformations changed the structure of entire sentence units, deleting, substituting, and adjoining forms in a sentence structure. Earlier structural grammars had almost inevitably confined themselves to the less powerful phrase structure rules. Chomsky showed that only by using both kinds of rules could a grammar come close to making explicit what it is a native speaker knows about his native language.

One rather disarming characteristic of Chomsky's insistence on explicitness was that the principles and claims underlying his theory of language were clear and therefore open to challenge. These claims could be disproven by empirical investigation not only of many languages but also of psychology and neurology. *Syntactic Structures* set off explorations by generations of doctoral students and their professors of scores and scores of languages, of language acquisition by children, and especially of the English language, mother-tongue of most of the investigators. Among them was Chomsky himself, very much aware that the mystery of language was far from being solved.

As Chomsky saw, his first book, important though it was, suffered from a number of major defects. A grammar of any language written on the 1957 model would be precise but unwieldy. Moreover there were many areas of sentence formation, semantic relations, and lexical information which were not dealt with, or which were treated clumsily. Lexical items, for example, were introduced into deep structures by the same kind of phrase structure rules as those indicating the major constituents of a sentence. One rule isolated a group of verbs into a category "transitive verb." A subsequent one subcategorized transitive verbs into those which require animate subject noun phrases and those which don't. Then again this subcategory contained further subcategories of verbs which can take on the progressive aspect and those like *know* which cannot:

* *Eric was not knowing Italian*

and so on until there were hundreds, potentially thousands of categories, some perhaps containing a single verb. Worse still, some significant linguistic generalizations could not be expressed within this system because the categories were set up as hierarchies. Thus nouns are subdivided into common nouns and proper nouns. Each of these categories is separated into concrete and abstract subcategories. Thus *democracy* is a common abstract noun. *Buddhism* is a proper abstract noun. *Christopher Columbus* is a proper concrete noun whereas *lighthouse* is a common concrete noun. The categories influence the type of verb that occurs with them and the presence or absence of an article. But the choice between *who* and *which* in relative clauses is one

of many indications that humanness and non-humanness are grammatically significant in English. So we further subdivide into animate and inanimate and then human and non-human. Thus the common concrete sub-category is separated into two others, one containing, for example, *cement, houses, books,* the other, *cow, doctor, tree-rat.* Then the common concrete animate nouns are further subdivided into human and non-human ones. The same kind of subdividing goes on in the proper noun category, since *Christopher Columbus* is a human noun which, like *doctor,* can be subject of a verb like *discuss,* be modified by *who* rather than *which,* and can unlike *rock* be the object of *murdered* (used non-figuratively). The trouble is that there is no way to justify using common and proper as higher level categories rather than animate and inanimate. The above hierarchy provides a simple way to formulate rules about common and proper nouns. But there is no easy way to talk about the properties all *human* nouns share. Instead we have to talk about *common* etc. *human* nouns and *proper* etc. *human* nouns. The hierarchy could as easily be the other way round with *animate/inanimate* at the highest level. When the *mass/count* noun distinction is included, matters get worse.

Furthermore the notion of transformation in *Syntactic Structures* includes both meaning-preserving and meaning-changing processes. The passive rule, which simply provided a paraphrase for certain kinds of active sentences, is quite a different kind of operation from the negative transformation which converted an affirmative into its negation. If meaning-changing processes are allowed, then the deep structure cannot be the sole component for semantic interpretation. The emphasis laid upon *kernel* sentences is misleading. What is important is the more abstract set of basic relationships expressing such notions as who does what to whom and with what modifications. Relationships such as deep subject, object, predicate phrase, and relative clause underlie all sentences not just kernels. The interrelationships of parts of complex sentences are unrepresentable in the deep structure. Instead they are produced by rules called *Generalized Transformations.* These are quite different from other transformations because they do not operate on a single sentence structure. Instead they combine artificially separate sentence structures. But since both subordination and co-ordination are very much a part of meaning, these notions should really be present in some fashion in the deep structure—if the deep structure is to represent basic meanings. After all

The boy wants it.

and

The boy goes home.

hardly mean the same as

The boy wants to go home.

Yet the basic insights—the fundamental notions of transformations, of a more abstract level of structure, of the recursive and creative properties of language, of the need for formal explicitness and of the kinds of empirical claims made in a formalized grammar seemed—and still seem—sound. In the seven years following *Syntactic Structures,* the transformational grammarians worked to modify and improve their model of language, to expand and deepen its coverage of particular languages and to isolate the universal characteristics of human languages. Edward Klima showed how question transformations could be made meaning-preserving by including in the deep structures of questions an element signifying "it is a question whether," abbreviated as QUESTION or WH. Since this question element is part of the meaning of the sentence, the deep structure more adequately represented the meaning. Moreover the symbol could be used to trigger the application of the question transformation. This shifts the auxiliary around the subject and replaces the question symbol. R. B. Lees put forward similar proposals for negative sentences. Gradually, and a little painfully, Chomsky, Klima, Postal, Lees, Rosenbaum and many others revised the notion of deep structure—indeed first gave it that name—so that it became a more abstract mental object embodying both the important earlier categories and relationships and also elements reperesenting negation, command and interrogation. A deep structure could now be quite complex, revealing considerable subordination and coordination. Such a deep structure was now a little closer to the ideal of a deep structure common to all human languages which would reflect the innate properties of the human mind. It was no longer necessary to have meaning-changing transformations. The deep structure provided all the information necessary for interpretation by a semantic component of the grammar. Kernel sentences and generalized transformations disappeared from almost everywhere but public school textbooks. The complex subcategorization system was replaced by another in which the various characteristics of individual words, many of them idiosyncratic, could be represented as properties or features that were not in a hierarchy but were unordered in a part of the deep structure called the lexicon. In the lexicon were entries for individual words and morphemes, a little like dictionary entries except that they specified such properties as "takes an animate subject," "plural only" and "abstract." Since human beings do acquire this lexical information in this non-hierarchical manner, this seemed a better model.

More importantly, this kind of lexicon could incorporate far more necessary information far more simply and intuitively than the earlier model. The basic subject, predicate and modifier relationships are previous to and separate from the lexicon. These are the aspects common to all languages.

The important book representing this rethinking about language is Chomsky's *Aspects of the Theory of Syntax* (1965). This and a number of more specialized books provided a firmer base for the more detailed exploration of languages, especially English.

But as linguists studied language in more depth than ever before, they found that the deep structure suggested in *Aspects* was still not adequate to represent some areas of meaning. Perhaps there was a deeper level, one which needed no separate semantic component because it was itself the meaning. Already the basic synonymy of

Garibaldi bought the alligator.
The alligator was bought by Garibaldi.
What Garibaldi bought was the alligator.
It was Garibaldi who bought the alligator.

and, in important ways,

for Garibaldi to have bought the alligator . . .
Garibaldi's having bought the alligator . . .
that Garibaldi had bought the alligator . . .

had been accounted for by postulating a common deep structure together with transformations converting it into the various surface structures. These transformations were all required not for just these constructions but for many other areas of English syntax. Sometimes they worked for other languages in much the same way.

But there were other instances where closely related and even synonymous sentences came from very different deep structures. Surely

Garibaldi bought an alligator from Cedric.

and

Cedric sold an alligator to Garibaldi.

are synonymous, though perhaps with a slight difference in focus. Cedric is no less an *actor* than Garibaldi. The verb *bought* has in common with *sold* the notion of a transfer probably for money. The alligator goes *from* Cedric *to* Garibaldi. One verb stresses the "from-ness," the other the "to-ness." Some highly influential work by Jeffrey Gruber explored this in more detail. Verbs like *buy* which contain a semantic notion plus *from* are quite common in English, as are the *to* verbs. Here are a few others:

from	*to*
get	give
acquire	yield
receive	grant
borrow	lend
win	lose

Some verbs contain both:

transfer	shift
pass	carry
move	toss
push	lift
migrate	hasten

What Gruber and many others were seeking to do was to go below the *Aspects* deep structure to a semantic rock-bottom where the various semantic notions would be separated out. At this level the categories of words (verbs, nouns) would be irrelevant. Chomsky's deep structure contained transitive and intransitive verbs. In fact the distinction is unimportant further down. For example there are two verbs *roll*, one transitive, one intransitive.

Jack rolled the egg towards the cliff.
The egg rolled towards the cliff.

But the same notion of motion underlies both. The first sentence has an additional *causal* feature, which could be expressed separately.

Jack caused the egg to roll towards the cliff.

This kind of semantic information thus has syntactic consequences. And motion verbs, like *roll*, and even *learn* are very different from the static verbs like *remain* and *know*. The former can always take the progressive (*be . . . ing*) forms, while the latter either don't take it at all or only do it when an *animate* subject is consciously causing the action.

He is learning French.
** He is knowing French.*
He is remaining in the room.
** It is remaining in the room.*

The work of Lakoff, Postal, Rosenbaum, Ross and others was showing that the surface structure parts of speech were not necessarily the best categories for the deeper structures. Lakoff showed that verbs and adjectives were basically the same kind of constituent in the deep structure. Of course many languages don't make the distinction even in the surface structure. In a brilliant paper, Postal showed that articles and pronouns were the same class at a deeper level and was thereby able to explain a number of mysteries in English syntax and dialect studies. This kind of research was gradually changing the underlying map of English grammar. In 1968 Jacobs and Rosenbaum's book, *English Transformational Grammar*, incorporated much of this work for a wider audience. Studies by Barbara Hall Partee,

Lightner and others challenged the apparently fundamental notions of deep subjects and objects, for there seemed to be under them a semantic level containing more basic notions. Paradigms such as the following were used to show that deep subjects were not as deep as claimed:

1. Someone broke the window with something.
2. Something broke the window.
3. The window broke.

Consider a set of semantic relations: *agent, object* and *instrument* (for *someone, the window* and *something* respectively). The first sentence uses all three categories with broke. If the noun phrase serving as *agent* is deleted, the *instrument* noun phrase can act as a subject. Hence the second sentence. If the instrument noun phrase is removed, then the *object* noun phrase becomes the subject. Hence the third sentence. From evidence like this, Fillmore, of Ohio State University, argued for going beneath the deep structure to a level where *cases* like agentive, instrumental and object expressed basic semantic relationships. The kinds of preposition, the actual forms of verbs, the type of noun (animate or inanimate, etc.), seemed to be influenced, in part controlled, by these deep deep structure cases. James McCawley, then at the University of Chicago, Paul Postal of IBM, Ross and Lakoff at Harvard and M.I.T., and many others tried to work out some ways of formulating a deep semantic structure, some using the notions of symbolic logic. others positing pro-forms like *cause-to-die* for *kill.* This kind of deep deep structure would be concerned with propositions rather than sentences. Consequently it would be a far more abstract level.

But with this deeper exploration came deeper problems. Too little is known yet about the nature of meaning, about what happens before a meaning "rises" to the approximate level, say of Chomsky's deep structure. In a recent and very important paper, "Remarks on Nominalization," Chomsky takes note of the various proposals and modifies his notion of the deep structure. Here base forms are not specified as nouns or verbs but have certain stated potentials for becoming one or more of these in the surface structure e.g. *refuse* or *refusal.* With changes like this, Chomsky's model of language approaches still more closely the ideal of a universal deep structure.

But the explorations and questioning still go on as languages are more and more exhaustively analysed. The present grammatical models can handle a vastly greater amount of data than the relatively simple model presented in *Syntactic Structures.* Yet in important respects the 1957 model and the 1969 models are much the same. The deep structure level, though not basically

semantic, is still a highly useful one for describing important aspects of language and for serving as a base upon which major transformations may operate. Such investigations have told us more about the structure of English than has been learned over many centuries. But the essential mystery of language, the mystery that is at the heart of humanness, remains. Hopes for early solutions are still premature.

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READING SUGGESTIONS

My monograph *On Transformational Grammar* is probably the easiest reading, followed by Jacobs and Rosenbaum's *English Transformational Grammar* and Langacker's *Language and Its Structure.* Lakoff's book is a little more difficult for non-linguists but well worth the effort.

Some of these later developments have been included in high school texts:

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